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EVERBOUQUET INTERNATIONAL CO., LTD.
Midas Components Ltd - Web: www.midascomponents.co.uk
Tel: 0044 1493 602602 Fax: 0044 1493 665111

PART NO. : **MC16021E-SERIES**

FOR MESSRS. :

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ACCEPTED BY: PROPOSED BY :

RECORD OF REVISION

DATE	PAGE	SUMMARY
2004/5/5	4/9	Change the height of LCM：15.0mm→”C”。
	8/9	Change the height of LCM：15.0mm→”C”，9.5mm→”A”。

3. General specifications

3.1 General specifications

PLEASE REFER TO:

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)".

3.2 This individual specification is prior to general specifications

3.3 NUMBERING SYSTEM

MC16021E	B	W	-	S	Y	M	L	O	U	N
	(1)	(2)		(3)	(4)	(5)	(6)	(7)	(8)	(9)

(1).CHARACTER FONTS：

PLEASE ERFER TO

"CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (MS-10-0069)"

(2).LCM TEMPERATURE：

"nil" ： NORMAL TEMP

"W" ： WIDE TEMP

(3).LCD TYPE：

"T" ： TN TYPE "S" ： STN TYPE

"H" ： HTN TYPE "F" ： FSTN TYPE

(4).LCD COLOR：

"Y" ： YELLOW-GREEN "B" ： BLUE(STN/NEGATIVE)/BLACK(FSTN/NEGATIVE)

"G" ： GRAY "W" ： WHITE(FSTN/POSITIVE)

(5)LCD POLARIZE TYPE

"nil" ： TRANSFLECTIVE

"M" ： TRANSMISSIVE

(6).BACKLIGHT TYPE：

"L" ： LED BACKLIGHT

"R" ： REFLECTIVE

(7).BACKLIGHT COLOR：

LED TYPE：

"nil" ： YELLOW-GREEN "A" ： AMBER "O" ： ORANGE

"R" ： RED

(8).VIEWING DIRECTION：

"nil" ： 6 O' CLOCK "3" ： 3 O' CLOCK

"U" ： 12 O' CLOCK "9" ： 9 O' CLOCK

(9).BACKLIGHT TYPE：

"nil" ： LED(+),LED(-)---NORMAL

"N" ： LED(+),LED(-)---CHANGE

4. Mechanical data

(1) NUMBER OF CHARACTERS ---------- 16 CH * 2 LINE

⚠1 (2) MODULE SIZE ---------- 84.0 W * 44.0 H * " C " T (Max) mm

(3) EFFECTIVE AREA ---------- 64.5 W * 16.0 H mm

(4) CHARACTER PATTERN ---------- 5 * 7 DOTS + CURSOR

(5) CHARACTER SIZE ---------- 2.96 W * 4.86 H mm

(6) CHARACTER PITCH---------- 3.55 mm

(7) DOT SIZE ---------- 0.56 W * 0.66 H mm

(8) DOT PITCH---------- 0.60 W * 0.70 H mm

NOTE：The dimension of "C"， please refer to Outline dimension on PAGE 8/9

5. Absolute maximum ratings

5.1 Electrical absolute maximum ratings

I T E M	SYMBOL	MIN.	MAX.	UNIT	COMMENT
POWER SUPPLY FOR LOGIC	V_{DD}-V_{SS}	0	6.0	V	-------
INPUT VOLTAGE	V_I	V_{SS}	V_{DD}	V	-------
STATIC ELECTRICITY	-------	------	100	V	NOTE (1)
POWER SUPPLY FOR LED	V_{LED}	--------	6.0	V	--------

NOTE (1): ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A 200PF CAPACITOR AND DISCHARGING IT BY CONTACT WITH A INTERFACE CONNECTOR PIN.

5.2 Environmental absolute maximum ratings

I T E M	CONDITION	OPERATING		STORAGE		COMMENT
		MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	NORMAL	0℃	50℃	-20℃	70℃	------
	WIDE	-20℃	70℃			
HUMIDITY	------	NOTE (2)		NOTE (2)		NO CONDENSATION
VIBRATION NOTE (3)	------	------	0.5G	------	2G	10~300Hz XYZ DIRECTIONS 1 Hr EACH
SHOCK NOTE (3)	------	------	3G	------	50G	10 msec XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	------	NOT ACCEPTABLE		NOT ACCEPTABLE		-------

NOTE (2): Ta ≦ 50℃: 90% RH MAX.

Ta ＞ 50℃: ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90% RH AT 50℃. (80%RH AT 60℃)

NOTE (3): 1G = 9.8 m/s^2

6. Electrical characteristics

$Ta = 25℃$ $V_{DD} = 5.0 \pm 0.25\ V$

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
INPUT VOLTAGE	V_{IH}	----------		2.2	------	------	V
	V_{IL}			------	------	0.6	V
OUTPUT VOLTAGE	V_{OH}	$-I_{OH}$ =0.205 mA		2.4	------	------	V
	V_{OL}	I_{OL} = 1.2 mA		------	------	0.4	V
POWER SUPPLY CURRENT	I_{DD}	V_{DD} = 5.0V		------	1.0	1.5	mA
RECOMMENDED LCD DRIVING VOLTAGE, NOTE(1)	V_{DD}-V_O	STN/ FSTN DUTY =1/16 Φ=10° NOTE(2)	Ta=-20°C	------	4.8	------	V
			Ta= 0°C	------	4.7	------	V
			Ta= 25°C	------	4.5	------	V
			Ta= 50°C	------	4.3	------	V
			Ta= 70°C	------	4.2	------	V
		TN DUTY =1/16 Φ=25° NOTE(2)	Ta=-20°C	------	4.7	------	V
			Ta= 0°C	------	4.6	------	V
			Ta= 25°C	------	4.2	------	V
			Ta= 50°C	------	3.8	------	V
			Ta= 70°C	------	3.7	------	V
POWER SUPPLY CURRENT FOR B.L.	I_{LED}	V_{LED} =5.0 V		------	120	150	mA

NOTE (1): RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTUATE ABOUT ±0.5V BY EACH MODULE.

(2): θ = 0° : VIEWING ANGLE AT 6 O' CLOCK

θ = 180° : VIEWING ANGLE AT 12 O' CLOCK

7. Optical characteristics

TN TYPE LCD

$Ta = 25℃$ $V_{DD}-V_O = 4.2V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 1.4 NOTE(1)	20	30	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 25° NOTE(1)	2.0	3.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)
	tf (fall)	Φ = 25° NOTE(1)	----	150	250	ms	NOTE(2)

STN TYPE LCD

$Ta = 25℃$ $V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	3.0	4.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

FSTN /STN BLUE TYPE LCD

$Ta = 25℃$ $V_{DD}-V_O = 4.5V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	Φ2-Φ1	K = 2.0 NOTE(1)	30	40	----	deg.	NOTE(2)
CONTRAST RATIO	K	Φ = 10° NOTE(1)	4.0	5.0	----	----	NOTE(2)
RESPONSE TIME	tr (rise)	Φ = 10° NOTE(1)	----	200	350	ms	NOTE(2)
	tf (fall)	Φ = 10° NOTE(1)	----	300	400	ms	NOTE(2)

Brightness for LCM

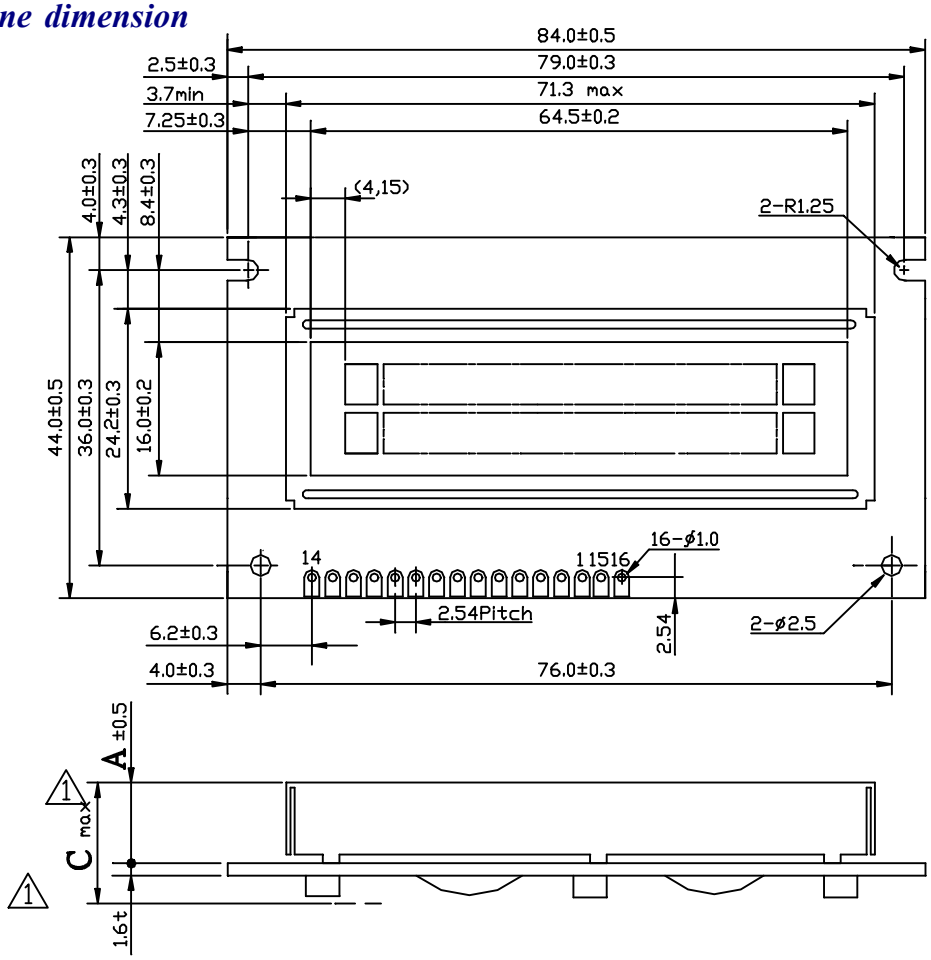
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
LED	B	Φ = 0° θ = 0°	5.0	----	----	cd/m^2	NOTE(2) NOTE(3)

NOTE (1): θ = 0° WHEN VIEWING ANGLE AT 6 O' CLOCK
θ = 180° WHEN VIEWING ANGLE AT 12 O' CLOCK

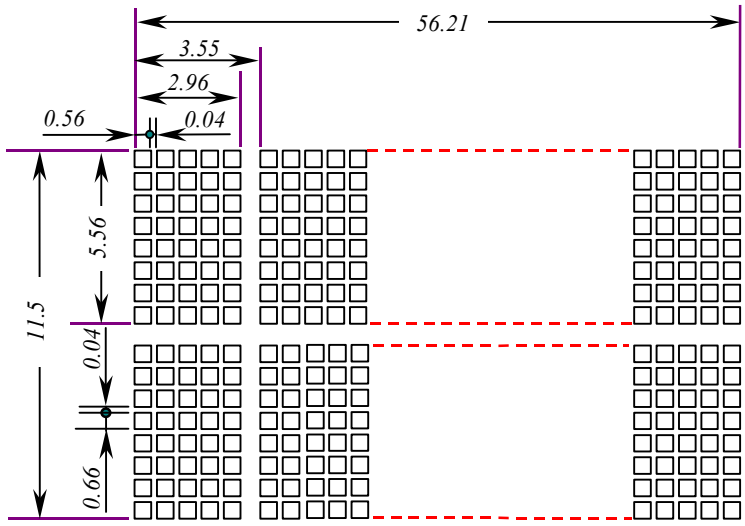
(2): SEE CUSTOMER ACCEPTANCE STANDARD SPECIFICATION FOR DEFINITION OF OPTICAL CHARACTERISTICS.

(3): UNDER NORMAL TEMPERATURE AND HUMIDITY IN A DARK ROOM.

8. Outline dimension



TYPE	A	C
LED B.L.	9.5	15.0
NO B.L.	4.9	10.0



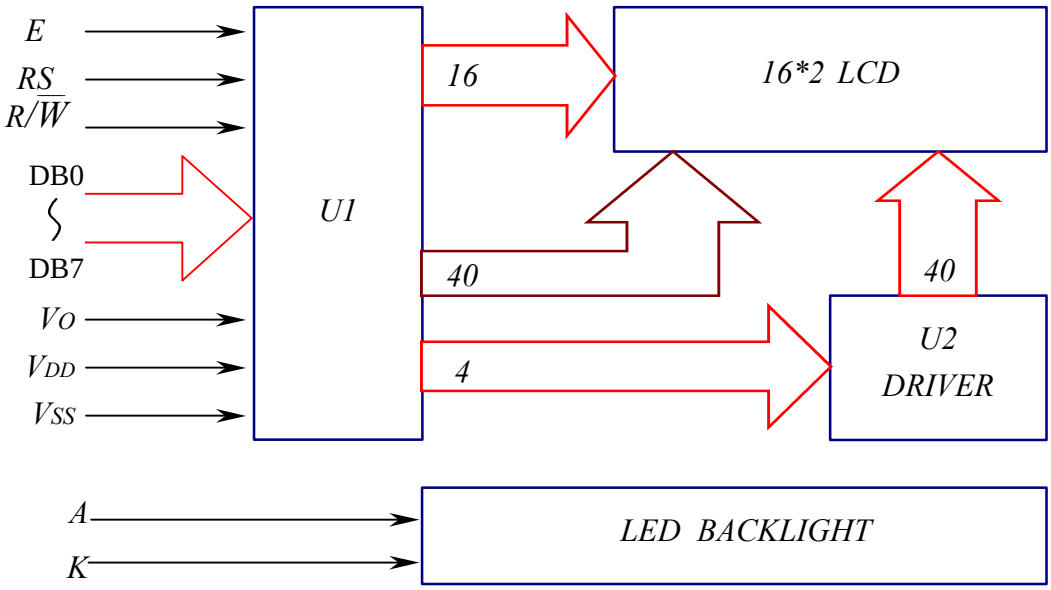
NOTE :
1.UNIT : mm
2.SCALE : NTS

Interface pin connection

PIN NO.	1	2	3	4	5	6	7
SYMBOL	Vss	VDD	Vo	RS	R/$\overline{W}$	E	DB0

PIN NO.	8	9	10	11	12	13	14		15	16
SYMBOL	DB1	DB2	DB3	DB4	DB5	DB6	DB7	LED B.L.	A	K
								NO B.L.	N.C	N.C

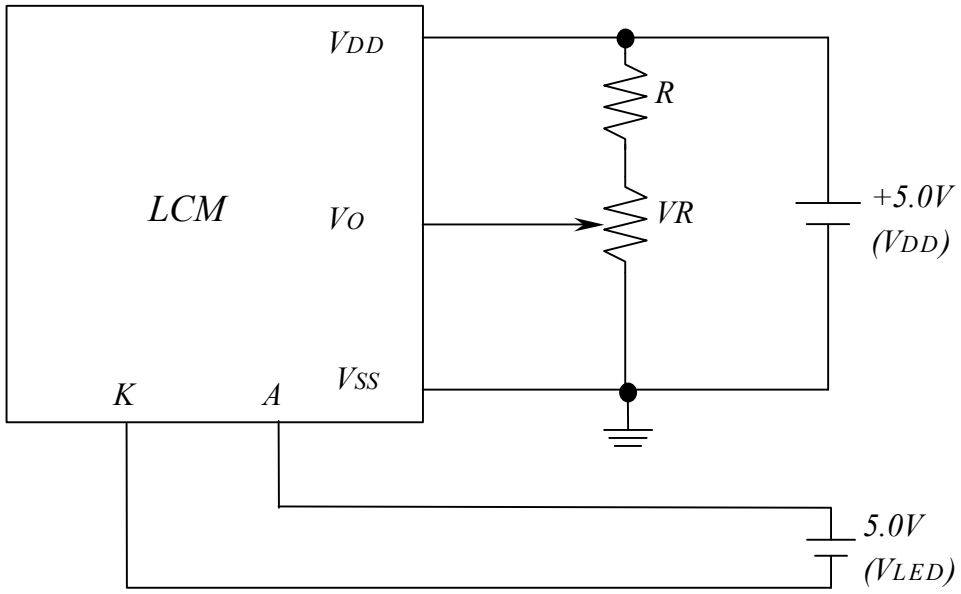
9. Block diagram



Display data address charts

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
LINE 1	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
LINE 2	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

10. Power supply for LCM



RECOMMENDED RESISTOR R : $V_{DD}-V_o \geqq 1.5V$

$V_{DD}-V_o$: LCD DRIVING VOLTAGE

VR: 10KΩ~20K